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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/642,282	08/18/2003	Naoki Ito	116373	2441

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EXAMINER	
CHUO, TONY SHENG HSIANG	
ART UNIT	**PAPER NUMBER**
1745	

DATE MAILED: 09/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/642,282	ITO ET AL.	
	Examiner	Art Unit	
	Tony Chuo	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 July 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-50* is/are pending in the application.

4a) Of the above claim(s) *1-12,35,39 and 49* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-34,36-38,40-48 and 50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Claims 1-50 are currently pending. Claims 1-12, 35, and 39 have been withdrawn from consideration. Claim 33 is amended and new claims 41-50 have been added.

Newly submitted claim 49 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Hara et al '667 teaches a reaction suppression layer that is a mixed conductor layer "50" of Ni & YSZ where Ni is a non-proton conductor and YSZ is a proton conductor (See paragraph [0048]). This mixed conductor layer is a different species than the insulating material in claim 49.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 49 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

The 112 rejection of claim 33 is withdrawn. Claims 13-34, 36-38, 40-48, and 50 do not overcome the previously stated 102 and 103 rejections. Therefore, claims 13-34, 36-38, 40-48, and 50 stand rejected under the following 102 and 103 rejections. This action is made FINAL as necessitated by the amendments.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 13-15, 18, and 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Edlund (JP 07-185277). The Edlund reference teaches an electrolyte membrane comprising a substrate formed from vanadium and an inorganic electrolyte layer, NiO, formed on both sides of the substrate (See paragraph [0045]). In addition, it also teaches a side of the electrolyte layer not in contact with the substrate that is coated with a hydrogen permeable material, Pd (See paragraph [0045]).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edlund (JP 07-185277) in view of Hockaday (US 5759712). The Edlund reference is applied to claims 13-15, 18, and 36 for reasons stated above. However, the reference does not expressly teach a substrate that includes two hydrogen separation membrane layers of different kinds of metal and a metal diffusion suppression layer in between the hydrogen separation membrane layers where the metal diffusion suppression layer contains at least one of a proton conductor, mixed conductor, an insulating material, a ceramic, and a proton-nonconductive metal. The Hockaday

reference does teach a substrate comprising two hydrogen separation layers "77" and "79" of different metals with a metal diffusion suppression layer that contains a proton-nonconductive metal in between the two hydrogen separation layers (See column 8, lines 16-26). Therefore, it would have been obvious to one of ordinary skill in the art to modify the Edlund electrolyte membrane to include a substrate comprising two hydrogen separation layers and a metal diffusion suppression layer so that hydration induced cracks can be mitigated in the substrate.

6. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edlund (JP 07-185277) in view of Hara et al (US 2003/0044667). The Edlund reference is applied to claims 13-15, 18, and 36 for reasons stated above. However, the reference does not expressly teach a reaction suppression layer between the substrate and the electrolyte layer that includes at least one of a proton conductor, a mixed conductor, and an insulating material. The Hara reference does teach a reaction suppression layer "50" composed of an insulating film in between the substrate "30" and electrolyte layer "20" (See Figure 1 and paragraph [0033]). Therefore, it would have been obvious to one of ordinary skill in the art to modify the Edlund electrolyte membrane to include a reaction suppression layer in between the substrate and the electrolyte layer in order to improve the heat resistant properties and prevent the layers from peeling off during heating and cooling.

7. Claims 21 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edlund (JP 07-185277) in view of Vaughey et al (US 6521202). The Edlund reference is applied to claims 13-15, 18, and 36 for reasons stated above. However,

the reference does not expressly teach a composite oxide containing an A-site material having an alkali metal element as a principal component and a B-site material having another element as a principal component such that the molar ratio of the A-site material to the B-site material is smaller than the constant molar ratio. The Vaughey reference does teach a perovskite oxide for solid oxide fuel cells comprising ABO_3 where A is an alkali metal and B is a transition metal (See column 1, lines 33-43). Burden is on the applicant to show difference in product comparisons. Therefore, it would have been obvious to one of ordinary skill in the art to modify the Edlund electrolyte membrane to include a composite oxide containing ABO_3 so that a material with good electrical conductivity and catalytic activity for oxygen can be used in the solid oxide fuel cell.

8. Claims 22 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edlund (JP 07-185277) in view of Vaughey et al (US 6521202).. The Edlund reference is applied to claims 13-15, 18, and 36 for reasons stated above. However, the reference does not expressly teach a composite oxide containing an A-site material having an alkali metal element as a principal component and a B-site material having another element as a principal component such that the composite oxide contains a predetermined amount of an oxide of a third material that forms an oxide together with the alkali metal. The Vaughey reference does teach a perovskite oxide for solid oxide fuel cells comprising $AA'BB'O_x$ where A is lanthanide, A' is an alkali metal and B is a transition metal (See column 1, lines 33-43). Burden is on the applicant to show difference in product comparisons. Therefore, it would have been obvious to one of

ordinary skill in the art to modify the Edlund electrolyte membrane to include a composite oxide containing $AA'BB'O_x$ so that a material with improved oxygen ion conductivity can be used in the solid oxide fuel cell.

9. Claims 23-25, 28-30, 33-34, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al (US 2003/0044667) in view of Edlund (JP 07-185277). The Hara reference teaches a fuel cell "100" comprising an oxygen electrode "10", a hydrogen electrode "30", a electrolyte layer "20" that is formed on the hydrogen electrode side of the substrate "30", and a reaction suppression layer "40" containing an insulating material (See Figure 1 and paragraph [0033]). It is well known in the art that fuel cells comprise an oxidizing gas supply portion and a fuel gas supply portion. However, the reference does not expressly teach an electrolyte membrane having a substrate formed from a dense hydrogen permeable material and an inorganic electrolyte layer where the substrate is formed from one of vanadium, niobium, tantalum and an alloy and the electrolyte layer is coated with a hydrogen permeable material where the substrate and coating are different kind of metallic materials. The Edlund reference does teach an electrolyte membrane having a substrate that is vanadium, an inorganic electrolyte that is NiO, and a coating that is palladium (See paragraph [0045]). Therefore, it would have been obvious to one of ordinary skill in the art to modify the Hara fuel cell to include an electrolyte membrane comprising a substrate that is vanadium, an inorganic electrolyte that is NiO, and a coating that is palladium in order to provide a stable composite metal membrane with high hydrogen permeability and a hydrogen selectivity.

10. Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al (US 2003/0044667) in view of Edlund (JP 07-185277) as applied to claims 23-25, 28-30, and 34 and further in view of Hockaday (US 5759712). However, the references do not expressly teach a substrate comprising at least two hydrogen separation membrane layers made of different kinds of metal and a metal diffusion suppression layer in between the separation membrane layers. The Hockaday reference does teach a substrate comprising two hydrogen separation membrane layers "77" and "79" made of palladium and a blend of Pt/Ru/Pd and a metal diffusion suppression layer "78" that is a proton non-conductive metal (See column 8, lines 16-22). Therefore, it would have been obvious to one of ordinary skill in the art to modify the Hara fuel cell to include a substrate comprising two hydrogen separation membrane layers made of palladium and a blend of Pt/Ru/Pd and a metal diffusion suppression layer that is a proton non-conductive metal in order to mitigate hydration induced cracks in the substrate.

11. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al (US 2003/0044667) in view of Edlund (JP 07-185277) as applied to claims 23-25, 28-30, and 34 and further in view of Vaughey et al (US 6521202). However, the references do not expressly teach a composite oxide containing an A-site material having an alkali metal element as a principal component and a B-site material having another element as a principal component such that the molar ratio of the A-site material to the B-site material is smaller than the constant molar ratio. The Vaughey reference does teach a perovskite oxide for solid oxide fuel cells comprising ABO_3 where A is an alkali metal

and B is a transition metal (See column 1, lines 33-43). Burden is on the applicant to show difference in product comparisons. Therefore, it would have been obvious to one of ordinary skill in the art to modify the Edlund electrolyte membrane to include a composite oxide containing ABO_3 so that a material with good electrical conductivity and catalytic activity for oxygen can be used in the solid oxide fuel cell.

12. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al (US 2003/0044667) in view of Edlund (JP 07-185277) as applied to claims 23-25, 28-30, and 34 and further in view of Vaughey et al (US 6521202). However, the references do not expressly teach a composite oxide containing an A-site material having an alkali metal element as a principal component and a B-site material having another element as a principal component such that the composite oxide contains a predetermined amount of an oxide of a third material that forms an oxide together with the alkali metal. The Vaughey reference does teach a perovskite oxide for solid oxide fuel cells comprising $AA'BB'O_x$ where A is lanthanide, A' is an alkali metal and B is a transition metal (See column 1, lines 33-43). Burden is on the applicant to show difference in product comparisons. Therefore, it would have been obvious to one of ordinary skill in the art to modify the Edlund electrolyte membrane to include a composite oxide containing $AA'BB'O_x$ so that a material with improved oxygen ion conductivity can be used in the solid oxide fuel cell.

13. Claims 41-42, 45-46, and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edlund (JP 07-185277) in view of Smotkin (US 2002/0031695). The Edlund reference is applied to claims 13 and 36 for reasons stated above. However,

the reference does not expressly teach an inorganic electrolyte layer that is a thin membrane that has a thickness of 0.1 to 1 μm and where the forming step is performed by a process chosen from the group consisting of physical deposition, chemical deposition, and sputtering. The Smotkin reference does teach an inorganic electrolyte layer, EIPC (Component C), that has a thickness of between 0.1 to 1 μm and is formed by a vapor deposition method (See paragraph [0089],[0090],[0106],[0187]). Therefore, it would have been obvious to one of ordinary skill in the art to modify the Edlund electrolyte membrane to include an inorganic electrolyte layer that is a thin membrane that has a thickness of 0.1 to 1 μm and where the forming step is performed by a process chosen from the group consisting of physical deposition, chemical deposition, and sputtering in order to provide an electrolyte layer that is stable at high temperatures and is formed by conventional methods of forming thin films.

14. Claims 43-44 and 47-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al (US 2003/0044667) in view of Edlund (JP 07-185277) as applied to claim 23 and 40 above, and further in view of Smotkin (US 2002/0031695). However, the references do not expressly teach an inorganic electrolyte layer that is a thin membrane that has a thickness of 0.1 to 1 μm and where the forming step is performed by a process chosen from the group consisting of physical deposition, chemical deposition, and sputtering. The Smotkin reference does teach an inorganic electrolyte layer, EIPC (Component C), that has a thickness of between 0.1 to 1 μm and is formed by a vapor deposition method (See paragraph [0089],[0090],[0106],[0187]). Therefore, it would have been obvious to one of ordinary skill in the art to modify the

Edlund electrolyte membrane to include an inorganic electrolyte layer that is a thin membrane that has a thickness of 0.1 to 1 μm and where the forming step is performed by a process chosen from the group consisting of physical deposition, chemical deposition, and sputtering in order to provide an electrolyte layer that is stable at high temperatures and is formed by conventional methods of forming thin films.

Response to Arguments

15. Applicant's arguments filed 7/21/06 have been fully considered but they are not persuasive.

Applicant's election with traverse of the election of species requirement in the reply filed on 7/21/06 is acknowledged. The traversal is on the ground(s) that a search for one species would encompass a search for the remaining species and could be made without serious burden and that claims 1, 3-7, 9-18, 23-28, 30, 33-36, 39, and 40 are generic. This is not found persuasive because a search for solid polymer membranes would require searching in different sub-classes and therefore could not be made without serious burden. In addition, claims 1, 35, and 39 are not construed as generic claims because a hydrated electrolyte layer is implying that it's a solid polymer membrane and an inorganic electrolyte layer is implying that it's an electrolyte for a solid oxide fuel cell since solid oxide electrolytes are not hydrated. Therefore, these two species are independent and distinct. The requirement is still deemed proper and is therefore made FINAL.

The applicant argues that the Edlund composite metal membrane cannot function as an electrolyte layer because the niobium oxide would be reduced to niobium metal causing a short circuit in the fuel cell. First, the examiner notes that the applicant incorrectly stated that the Edlund reference teaches a niobium layer because the Edlund reference actually teaches a nickel oxide layer. Second, the intended use of the membrane is not given patentable weight in the preamble of the claim because the claims do not require a fuel cell or any electrochemical reaction in the membrane. Third, there's no evidence to show that nickel oxide in the composite metal membrane would reduce to cause a short circuit. Therefore, Edlund '277 meets all the limitations of claims 13-15, 18, and 36.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571) 272-0717. The examiner can normally be reached on M-F, 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

RAYMOND ALEJANDRO
PRIMARY EXAMINER